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## A Tertiary Ephedra

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Ramis aphyllis, articulatis, geminatis oppositis ad articulos. Internodiis striatis; iis ramulorum adaxialium quam eis abaxialium brevioribus.

The present specimen is a thin carbonaceous residue, representing a curved section of stem. It consists of a single node and part of each of the adjoining internodes, and from the node arise two branchlets lying in the plane of curvature of the main stem. The first internode of the branchlet on the concave side is considerably shorter than that of the branchlet on the convex side. A third exceedingly slender branchlet lies above and to one side of the main part of the specimen, but is not organically connected with it.

The rock bearing the fossil was broken apart in such a way that the specimen is split into halves. Fig. 1 is a photograph of the more distinct half.

OCCURRENCE: Miocene Florissant beds of Colorado. Collected by K. Vreeland, 1901. Deposited in the museum of the New York Botanical Garden.

A similar species, *Ephedra nudicaulis* Saporta, has been described from the Miocene flora of Aix-en-Provence (Saporta 1889), but it differs from the present specimen in having scaly nodes. *Ephedra johniana* Goepf. and Berendt, in the Tertiary flora of Bernstein, is described from a twig bearing pistillate cones (Goepfert and Menge 1883). Consisting of different parts of the plant, a satisfactory comparison with the present specimen is not possible, but it does not seem to be the same species. *Ephedra sotzkiana* Ung. (Unger 1870), *E. mengeana* Goepf. (Goepfert and Menge 1883) and *Ephedrites sotzkianus* Ung. (Unger 1850, Heer 1885) bear little or no resem-

blance to the present specimen. It, therefore, appears to represent a hitherto undescribed species.

By comparison with living species, this specimen was found to match most closely *Ephedra nevadensis* S. Wats. In many specimens of this species the branchlets are prevailingly in pairs and opposite at the nodes (Fig. 2), though in other specimens they are whorled. The branches in leaving the parent stem generally bend sharply upwards, in which case the branchlets which the branches bear on their concave or adaxial side have shorter basal internodes than those on the abaxial side, closely approximating the condition found in the fossil speci-

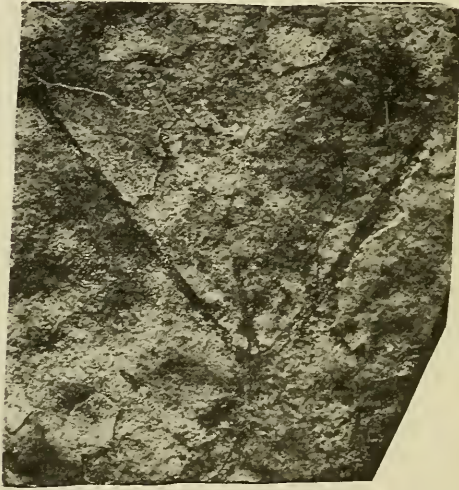


Fig. 1. Photograph of one half of the specimen of *Ephedra miocenica*, sp.  $\times 8$ .

men. The fossil is therefore presumably the basal section of probably a secondary or tertiary branchlet. This habit of branching, with the basal internodes of opposite branches of different lengths, is not common among living species of *Ephedra* and, among the available specimens, was encountered only in *E. nevadensis*.

It appears likely that the slender contorted branchlet in the fossil, though not now in organic connection with the rest of the plant, was originally a part of it, probably arising from a lower node. Similar slender branchlets occur in several living

species of *Ephedra*, originating from the same nodes with and between the larger branchlets.

So far as I have been able to ascertain the only other record of fossil *Ephedra* in the Tertiary of America is that of the pollen species, *Ephedra eocenipites* which was described by the writer (Wodehouse 1933) and found to be abundantly represented in the Green River oil shales. In view of the fact that the Florissant flora is a Miocene derivative of the Eocene Green River flora and is characterized by many similar species, the finding of

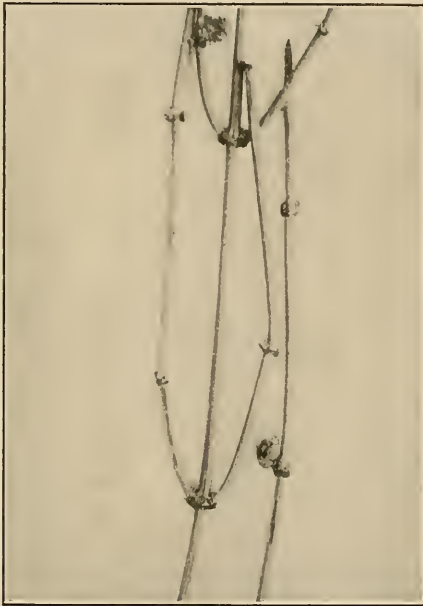


Fig. 2. Photograph of herbarium specimen of *Ephedra nevadensis* S. Wats. at same magnification as Fig. 1.

this fossil is of exceptional interest; and it rather certainly establishes the existence of *Ephedra* in America during the Tertiary period.

I am greatly indebted to the authorities of the New York Botanical Garden for the opportunity to study this specimen, and especially to the late Dr. Hollick for directing my attention to it. He stated that he believed that the specimen would prove

to be *Ephedra*, though he was not prepared to say so definitely at that time.

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